United States | 2022

Research

2022 Life Sciences Research Outlook & Cluster Rankings

Science doesn’t stop, innovation advances

Investment in new innovations and advanced modalities will continue to drive the industry forward

The life sciences industry has not been immune to the macroeconomic challenges plaguing the global economy this year, but these short-term challenges won't be a roadblock for the incredible growth predicted over the long term. Science doesn't stop, and investment in new innovations and advanced modalities will continue to drive the industry forward over the long-term horizon. While we'd never call any industry recession-proof, the life sciences industry is better positioned than most because of its countercyclical drivers that will sustain forward momentum.

Top clusters have evolved over several decades, but emerging markets are planting the seeds of industry infrastructure today to foster long-term opportunities for occupiers. The convergence of science and technology is happening within innovation communities across markets, with pockets of growth emerging in markets like Houston, Los Angeles and Pittsburgh, among others.

This year's Life Sciences Cluster ranking was developed with these trends in mind and takes into consideration the factors that drive long-term resilience and opportunity. But a static list can only reveal so much, so this year we've included a second view, our Life Sciences Cluster Composition Matrix, revealing where each market stacks up in terms of human and physical capital. These tools are meant to provide directional guidance on which markets offer opportunity but also where investment in certain aspects may move them forward.

Contents:

Amber Schiada,
Americas Head of Work Dynamics and Industry Research

Key findings in this year's outlook:

1.

Current industry fundamentals are slowing

Current industry fundamentals are slowing as public capital retrenches and capital conservation among start-ups becomes front of mind. But this is a short-term challenge, and the flow of capital remains well above historical trend.

2.

Commercial real estate demand is slowing

Commercial real estate demand is slowing as tenants take pause or re-lease excess space to the market. But demand remains above historical levels, and space is still scarce, with vacancy at sub-6% across the top clusters in aggregate.

3.

Emerging clusters may present early-mover advantages

Clusters with the right talent, healthy levels of funding and investment, and the real estate infrastructure to support expansion will remain the most resilient during the short term, though emerging clusters may present early-mover advantages.

4.

Short-term challenges are a temporary blip

Science doesn't stop: short-term challenges are just a temporary blip on the long-term path of growth. Novel therapies, innovative new modalities, increased adoption of advanced technologies and our insatiable demand for health and wellness will drive the investment and growth forward for the foreseeable future.

2022 Life sciences clusters

Cluster name	2022 overall rank
Boston	1
San Francisco Bay Area	2
San Diego	3
Greater DC & Baltimore	4
Philadelphia	5
Raleigh-Durham	6
New Jersey	7
New York City	8
Seattle	9
Salt Lake City	10
Pittsburgh	11
Minneapolis–St. Paul	12
Houston	13
Chicago	14
Denver-Boulder	15

** Full ranking details can be found on page 13*

1. Current state of the industry

Funding and capital markets environment

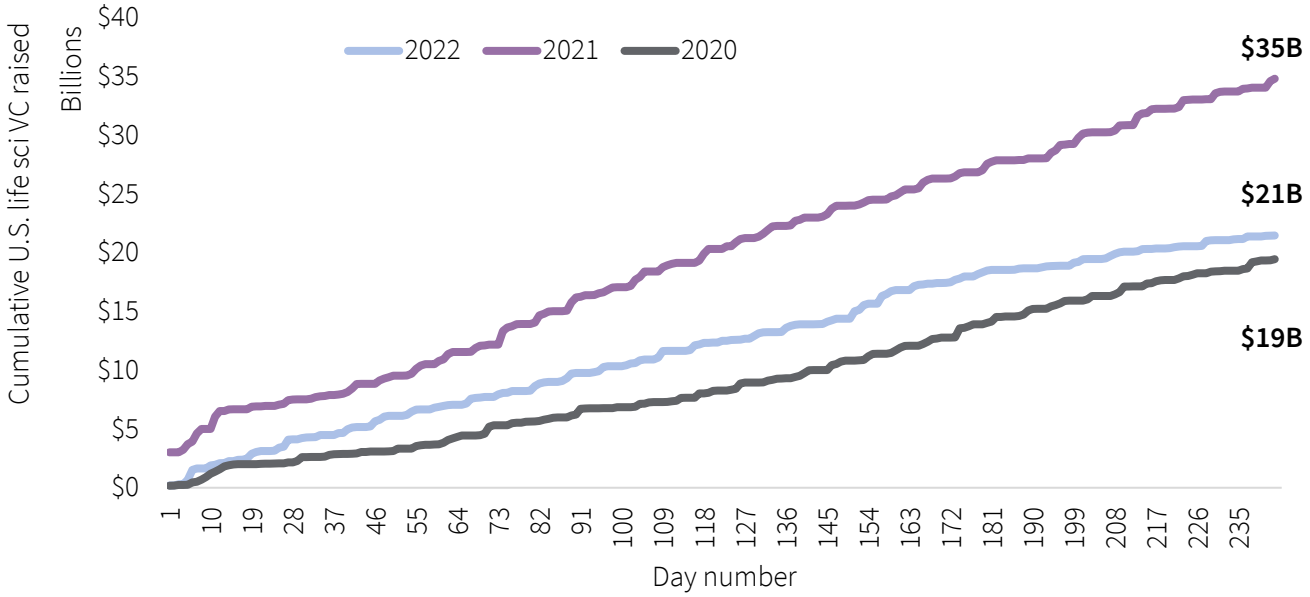
Private capital trends

The funding environment for biotech companies in 2022 stands in contrast with the heady days of late 2020 and 2021. With the door to going public essentially slammed shut in 2022, companies seeking private capital have been greeted with a relatively warmer welcome. The $21.5B doled out to life sciences start-ups through August 31 is nearly $2B more than was raised during that time frame in 2020. However, 2022 is -38% below the capital flowing during the peak of 2021. The still-high (historically speaking) flow of venture capital is a bulwark against the choppiness facing the sector.

Top-flight life sciences VCs have continued to post healthy fundraises, which will provide a much-needed ballast for the sector in an uncertain environment. Atlas Venture, Third Rock Ventures, 5AM Ventures and Andreessen Horowitz have raised nearly $4B of life sciences–focused funds this year alone, for example, and the spigot is still open. VCs are looking to de-risk away from nascent companies with unproven technologies that are in essence "moonshots." They will likely gravitate toward start-ups with which they have established relationships, those with highly respected founders or those with candidates further along the drug pipeline than not. Markets with companies exhibiting these traits will prove more resilient than others.

Private capital remains most resilient source of capital for growing biotechs amid falloff from highs of 2021

Daily YTD cumulative VC raised by U.S. life sciences companies, through August 31



Source: JLL Research

Public market trends

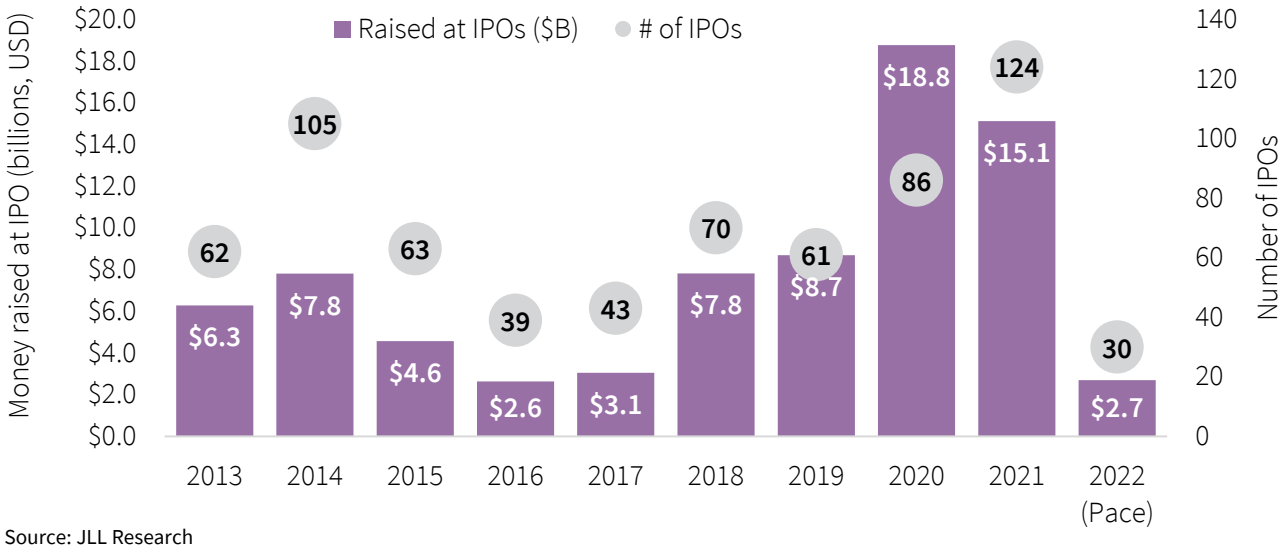
Acquisitions aside, going public is one of the primary avenues by which founders, employees, private capital and the assorted early-stage believers in biotech companies get their "exit." The dynamic between 2022 and 2021 could not be more inverted. Only 20 U.S.-based life sciences companies have gone public in the first two-thirds of 2022, raising a full-year pace of $2.7 billion of funds at initial offer. This stands in stark contrast with 2020 and 2021, where that full-year 2022 figure was matched every two months.

If the trend holds through year's end, 2022 will represent the lowest number of biotech companies going public in at least 10 years. This has proven to be a great fundraising obstacle for companies, who across the board are adopting measures to become leaner and operationally more efficient in an effort to extend their cash runway. Oftentimes this means some combination of subleasing excess real estate, shaving headcount and shutting down relatively unpromising drug programs.

The upshot is that if the public market reception to life sciences companies is as frigid as the first eight months of 2022 have been, both privately held companies and companies that went public early will have to recalibrate and hunker down. Expect the Big Pharma and established biotechs to be active in the partnership and acquisitions space for the foreseeable future as start-up valuations remain subdued, fresh injections of capital are increasingly unavailable in the capital markets and a small number of biotechs inch closer to running out of cash to fund day-to-day operations.

Only 20 companies have gone public YTD after 124 did so in 2021

U.S. Life Sciences IPOs



Source: JLL Research

Commercial lab real estate trends

Demand fundamentals

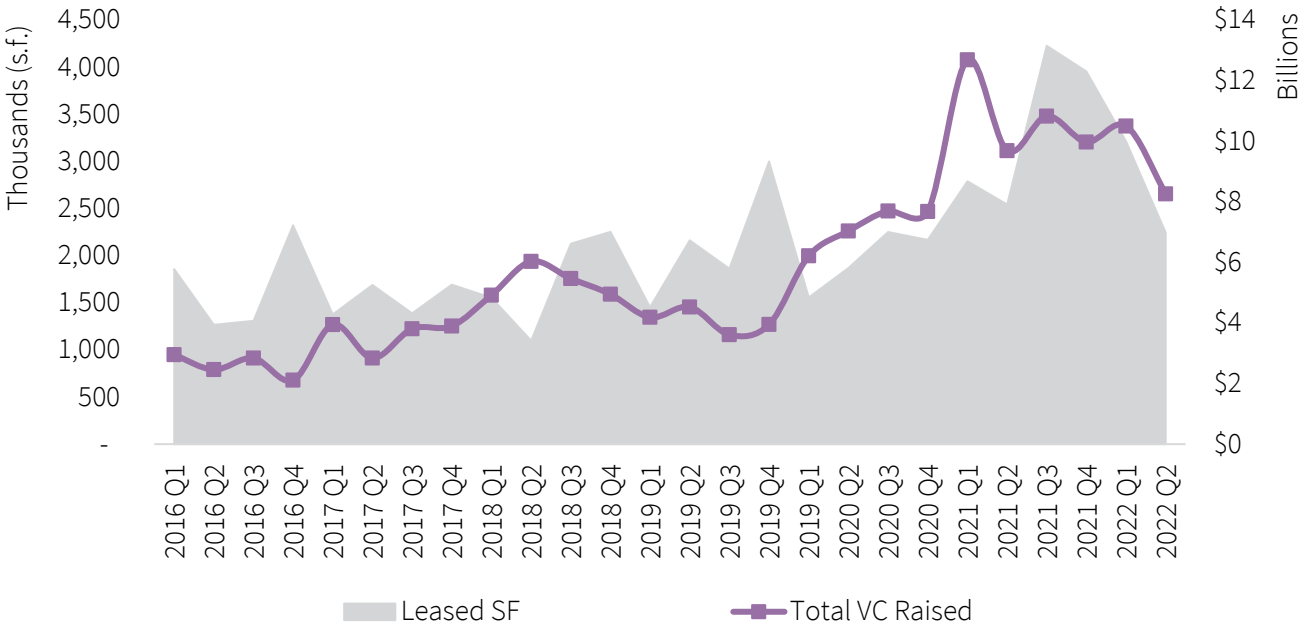
The funding crunch has crimped demand for life sciences space in 2022, after soaring venture capital inflows and company valuations gave companies the ammunition to expand at a rapid pace in the preceding two years. Now, as some companies wind down operations and stretch out funding, new demand (as measured by tenants touring the market for space) is falling off from the historically high levels of demand reached a year ago. Year-over-year, tenant demand has declined by 33% across the top-five largest U.S. markets, a drop of 7.2 million s.f. in 12 months.

Boston, the top U.S. market, is not immune to this broader trend. Demand for space doubled from mid-2020 to mid-2021, and the growth in available space could not keep up. Since the end of 2021, demand has fallen from 7.1 million s.f. to 4.4 million s.f. Even in this softening environment, demand for life sciences space still sits above the pre-COVID average.

The level of demand in any life sciences market is highly correlated with recent funding levels. Until there is a rebound in venture funding, and IPOs and secondary offerings pick up, demand is likely to stay well below mid-2021 levels in the near future. And so long as demand remains soft, there will be a re-emergence of Class A and B products in markets with large amounts of space delivered in recent years—something that was not the case amid the crunch for space in the last two years and may even offer tenants some opportunities to snag high-quality space.

Venture capital investment is one of the strongest leading indicators of commercial lab demand

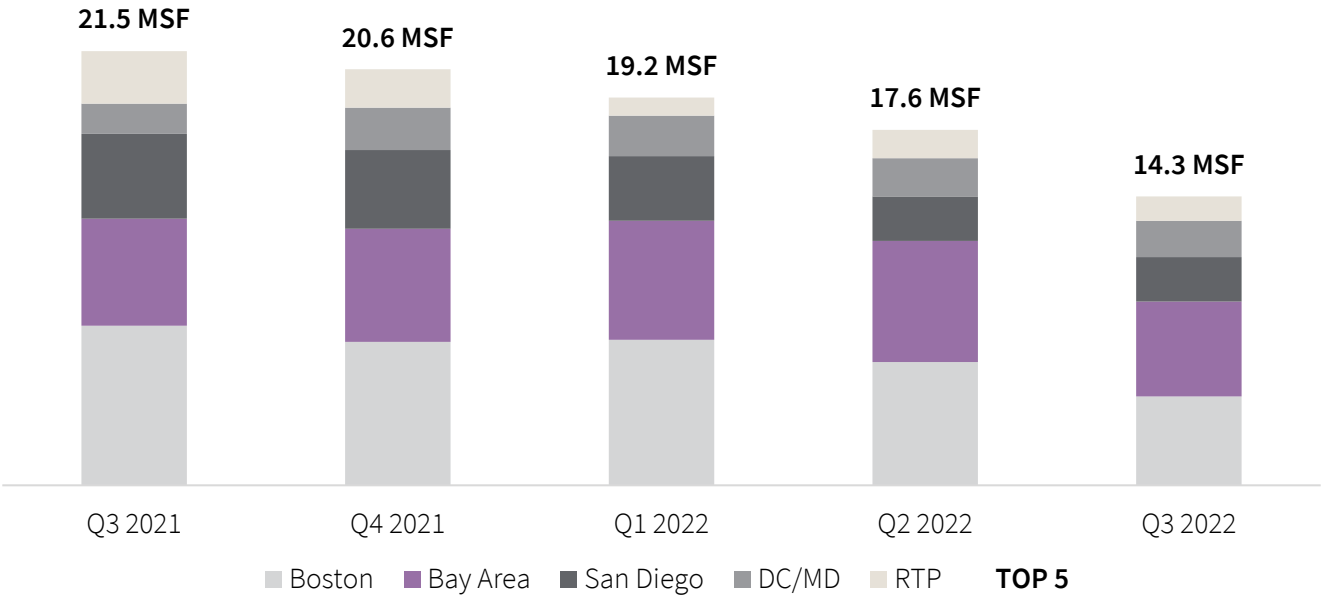
Leasing activity vs. VC funding
(Boston, SF Bay Area, San Diego)



Sources: JLL Research, Crunchbase

Tenant demand slides as companies have less capital to spend on expansions

Aggregate life sciences demand (s.f.),
Top 5 largest markets



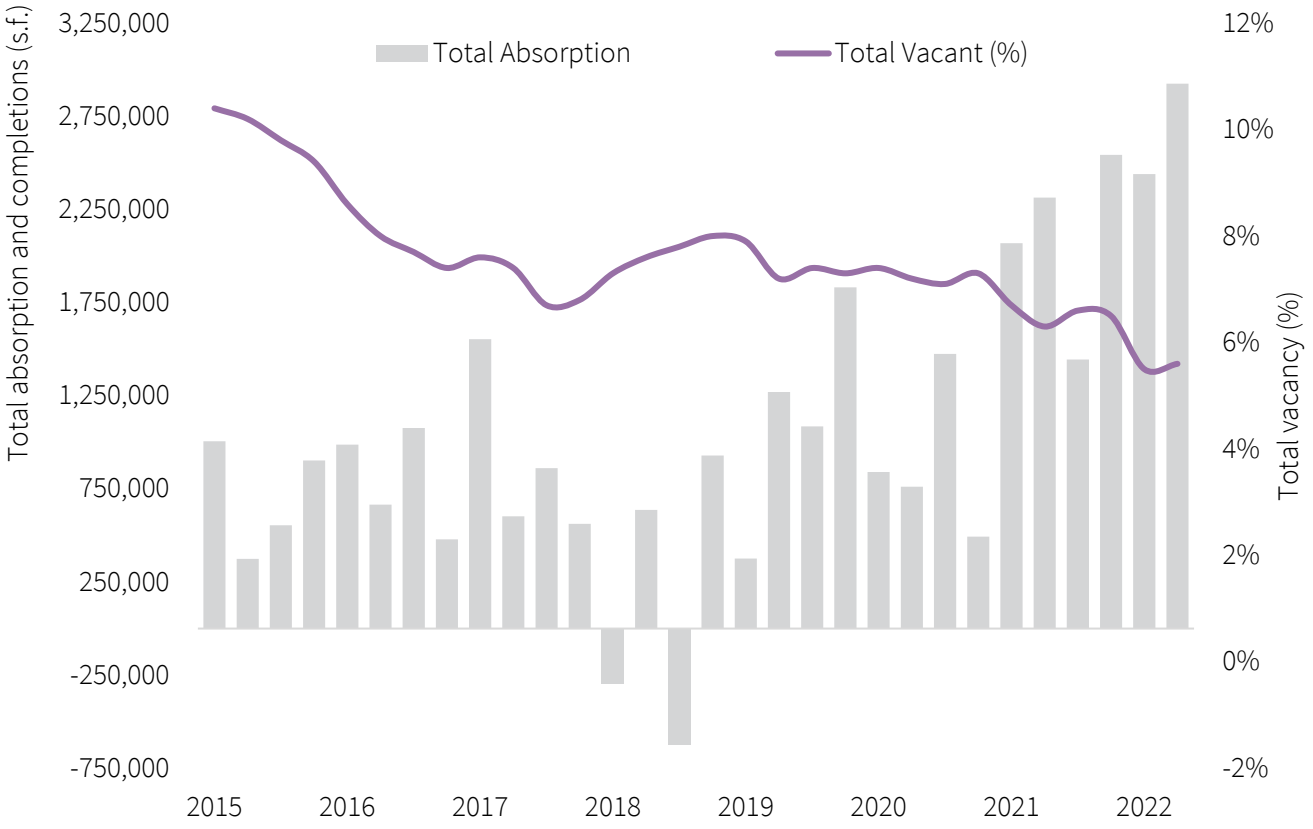
Source: JLL Research

Supply fundamentals

The supply landscape has shifted in the past 12 months. In mid-2021 the record growth in demand was reaching its peak, with the growth in new lab spaces unable to keep up. This dynamic created a great deal of pressure in many lab markets. Vacancies fell in top markets and rents grew year-over-year by an average of 19% across Boston, Philadelphia, Bay Area, Raleigh-Durham, San Diego, Seattle and Metro DC.

In those markets a collective 9.6 million s.f. of new product has delivered in the past year, closely tracking with the 9.1 million s.f. of absorption in that time frame. From July 1, 2021, to July 1, 2022, the development pipeline has grown in these markets by 73%, up from 20.8 million s.f. to 36.2 million s.f.

Total vacancy remains low as new supply has been steadily absorbed by growing firms



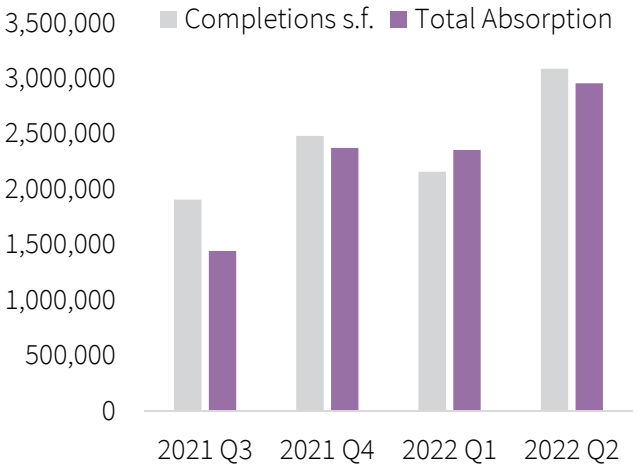
Source: JLL Research. Top markets include Boston, San Diego, SF Bay Area, Greater DC, RTP, Seattle and Philadelphia.

While many clusters have seen great successes in preleasing, direct available space has also jumped from over 10 million s.f. to nearly 25 million s.f., almost all of which was attributable to the enlargement of the pipeline. This growth will moderate in the next year, as the cost of financing has jumped considerably and many spec developments will likely wait out this period of a mismatch of demand and supply.

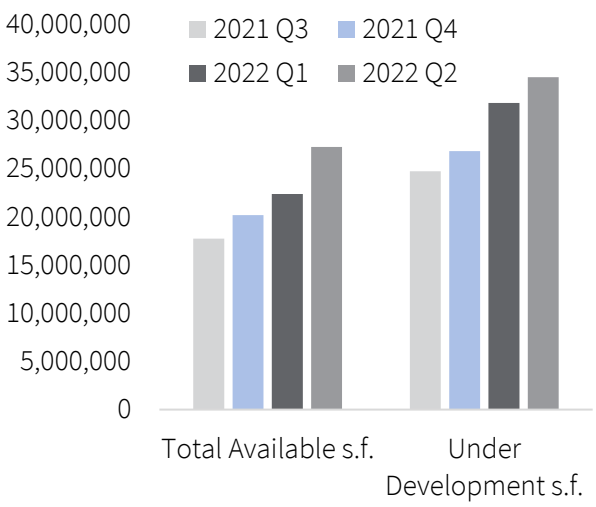
Since the spring of 2022, subleases have started to increase, albeit moderately. In Boston, for instance, roughly three-quarters of subleases added year-to-date are attributable to companies defensively taking too much space in the rush for limited space last year. For the first time, many early-stage tenants in the market have move-in-ready space that requires little capex, a key consideration as many boards and investors are preaching cash preservation in a tight funding environment. The upshot is these spaces are highly sought-after short-term solutions in the market and have seen a good deal of leasing activity at good rents.

Venture capital investment is one of the strongest leading indicators of commercial lab demand

Building deliveries and absorption, top 7 markets



Development pipeline and avail. space, top 7 markets



Source: JLL Research

2. Long-term outlook

Most of this report has focused on what has changed in the past 12 months, which in most cases represented a downshift from one year ago. Year-to-date this has been one of the more trying years in recent memory for a sector that has had incredible growth in both the technology itself and investor interest in developing it. The short-term path for the sector will certainly look much like it has this year: belt-tightening, a difficult funding environment and increasing personnel and research costs.

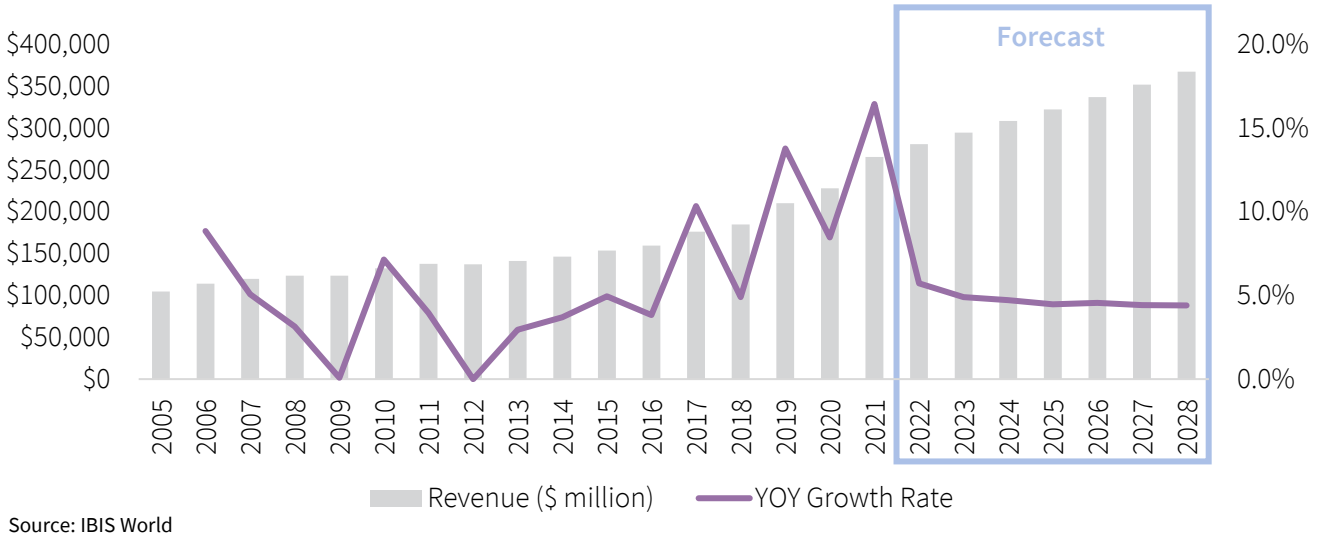
Despite all of that, the long-term potential of the sector remains materially unchanged since 2021. Innovation is happening at a more rapid pace than ever before. The fruits of research into cell and gene therapy are just now being harvested. Revenue growth has taken off in the past five years as the sector becomes larger, an atypical growth track. Three of the largest annual revenue jumps in biotech R&D in the past 20 years have occurred in the past five years as the sector accelerates into a new age of innovation.

The ultimate fount of consumer demand—therapies that equip us to live longer, healthier lives—is poised for tremendous growth in the coming decades. Over half of all healthcare spending in the U.S. is driven by those aged 55 and older, who today make up 29% of the population. This aging cohort is projected to leap from 96 million today to around 110 million in 2030. Novel therapies and technologies within the realms of personalized and regenerative medicine will continue to scale, revolutionizing the industry. R&D spending has sped up, growing 10% over the past five years. Big Pharma's balance sheets have never been healthier, to the point where they have (based on EY's research) the most firepower they've ever had to acquire companies and form partnerships.

In sum, long-term end-user growth, new research modalities, a huge unaddressed market opportunity and a promising drug pipeline will help the industry regain its footing after the uncertainty of 2022 passes.

Since 2017, revenue growth has surged; more growth projected based on emerging technologies

U.S. biotech R&D sector revenues (in millions USD)



Source: IBIS World

This year's cluster model aims to answer the question…

> *"Where are the strongest life sciences cluster markets, and which markets are exhibiting early signals of opportunity for continued expansion?"*

Or asked a different way, where are the top life sciences clusters, and what makes them so; and which of today's secondary markets show promise in developing into more mature clusters over the long term?

- JLL Research

3. Life sciences cluster analysis and ranking

Cluster rankings

Markets across the country continue to develop into more innovative communities. Just as tech expanded out of the Bay Area over the last 10 years to become a ubiquitous industry across markets, the life sciences industry is starting to grow in new markets outside of the Bay Area and Boston, the latter of which remains the undisputed center of industry in the U.S.

Innovation communities take decades to evolve. The world-class ecosystem that defines Boston's life sciences cluster is not easily replicated. Universities, institutions, governments and industry players across the U.S. are investing in the development of new and expanded innovation clusters, with increased focus on expanding our capacity for breakthrough scientific developments.

This year's cluster model aims to answer the question, Where are the strongest life sciences cluster markets, and which markets are exhibiting early signals of opportunity for continued expansion? Or asked a different way, where are the top life sciences clusters, and what makes them so; and which of today's secondary markets show promise in developing into more mature clusters over the long term?

Our cluster model is defined by the key components of a successful life sciences ecosystem: access to talent, funding that leads to commercialization and real estate infrastructure to support further growth.

Not only do we use aggregate measures of the above, but this year we placed a particular emphasis on incorporating growth metrics into the model to help us try to divine which markets have been growing quickly right under our noses. Taken together, our model is a blended approach that shows markets based on their sheer strength today, but also on their potential tomorrow, so long as they continue down their current growth paths.

Talent

Talent access is critical for growing companies and can define the resilience of a market for future growth. Not only is size of the talent pool important, but growth and momentum, educational attainment, talent concentration and demand for talent illustrate which markets offer companies opportunities to grow quickly or uncover new markets for potential expansion.

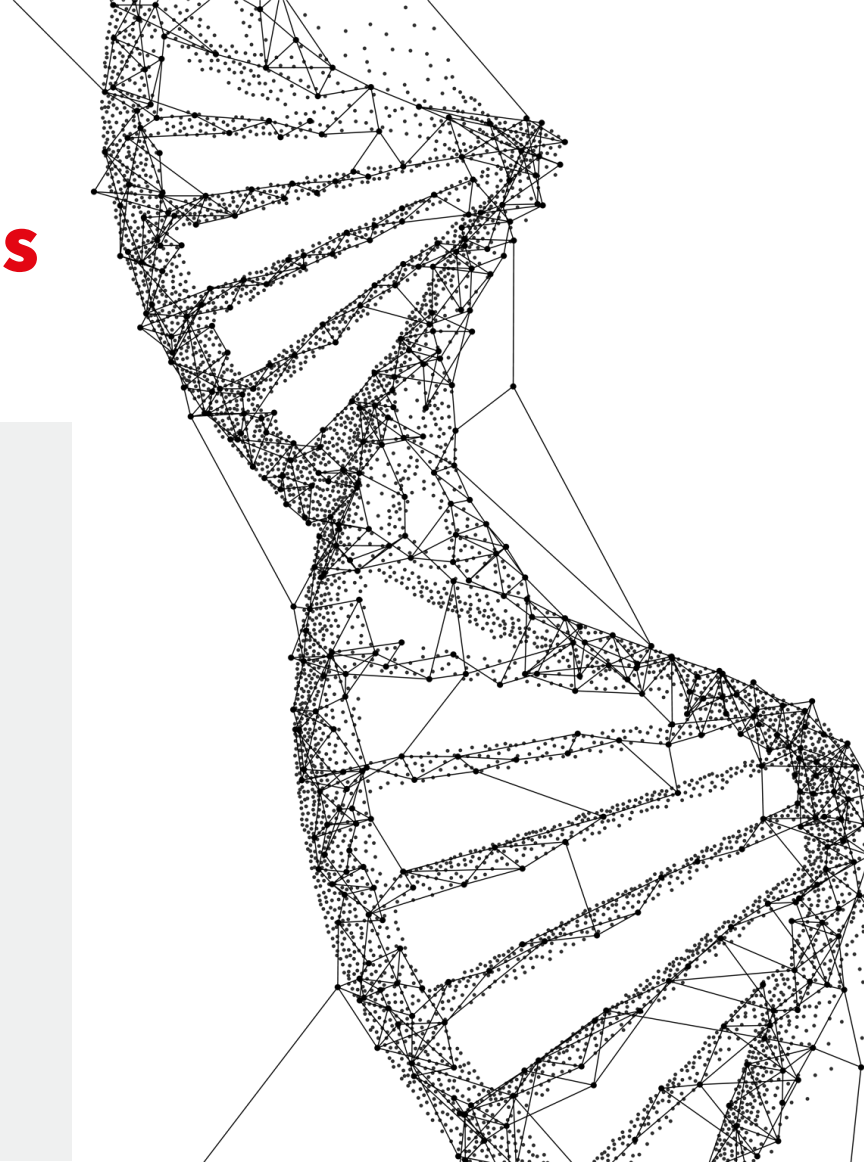
Funding

Funding is the lifeblood of the industry and ultimately commercialization and real estate demand. University investments into life sciences R&D efforts and National Institutes of Health (NIH) grant allocations provide seed funding that's critical to scientific intellectual property generation. Venture capital funding is a critical indicator of downstream commercial real estate activity.

Commercial real estate

Commercial real estate is critical to industry growth, and markets that have the scale and growth to host company formation will be more attractive to growing firms who need to scale quickly. Measuring absolute market size, recent supply growth and pricing metrics indicates which markets have the physical infrastructure in place to support new growth, just as much as they highlight a market's potential real estate investment opportunity.

2022 life sciences cluster rankings



Composite score includes:

Talent (35% weight)
- R&D industry employment: size and growth
- Industry employment concentration
- Company formation
- Occupational density and demand
- STEM degrees

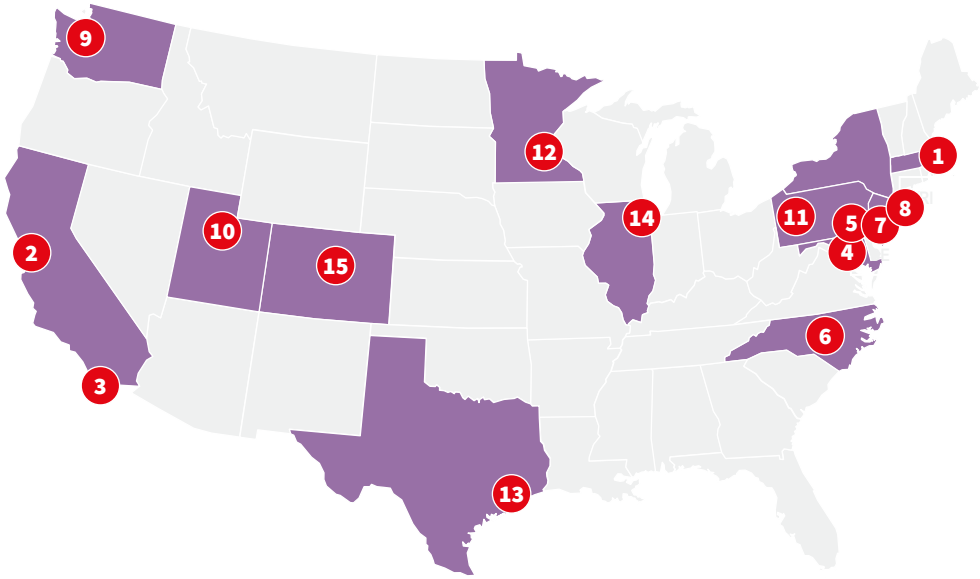
Funding (30% weight)
- NIH funding volume and growth
- Venture capital volume and growth
- University R&D investment
- Tech transfer success

CRE (35% weight)
- Real estate inventory and supply growth
- Asking rent and rent growth

Cluster name	2022 overall rank	Talent rank	Funding rank	CRE rank
Boston	**1**	1	2	1
SF Bay Area	**2**	2	1	2
San Diego	**3**	3	3	3
Greater DC & Baltimore	**4**	6	4	7
Philadelphia	**5**	8	8	8
Raleigh-Durham	**6**	4	21	4
New Jersey	**7**	5	5	14
New York City	**8**	12	6	13
Seattle	**9**	13	10	10
Salt Lake City	**10**	7	9	19
Pittsburgh	**11**	23	18	5
Minneapolis–St. Paul	**12**	25	19	6
Houston	**13**	20	23	9
Chicago	**14**	14	15	12
Denver-Boulder	**15**	10	16	17

Source: JLL Research

The top 15 life sciences cluster markets:



1. Boston

+	Home to the most life sciences companies, the largest industry employment, the greatest existing lab footprint and foundational biomedical research
–	Rate of growth in varying momentum metrics lags in comparison to high-growth emerging markets

2. San Francisco Bay Area

+	Receives the most venture capital funding and has the best track record with translational efficiency
–	Like Boston, the growth rates in varying metrics were slower than some high-growth markets

3. San Diego

+	In a league of its own. Consistently the third ranked market in size, employment and funding
–	San Diego industry employment and talent pool is lower than expected given its market size

4. Greater DC & Baltimore

+	NIH funding in Greater DC & Baltimore has always been strong, and venture capital has sharply accelerated in recent years
–	Growing venture capital interest hasn't translated to rapid growth in industry

5. Philadelphia

+	Home to a deep and growing pool of talent coming from the region's strong universities
–	Despite being a leader in cell and gene therapy, Philadelphia has not added much inventory in the past few years to accommodate that growth

6. Raleigh-Durham

+	Delivered a fair amount of lab development over the past two years and is one of the preeminent biomanufacturing hubs in North America
–	Consistently lags in venture capital funding in comparison to other top markets

7. New Jersey

+	Strong momentum in venture capital funding in one of the country's oldest pharma hubs
–	Funding has yet to translate into strong company formation

8. New York City

+	Due to the size of metro area, cumulative venture capital funding over the past few years is quite high; likewise for their large pool of biological scientists
–	Weak life sciences talent concentration and not much life sciences physical infrastructure

9. Seattle

+	Biopharma industry growth quite fast in past few years
–	Life sciences talent density is light

10. Salt Lake City

+	Strong momentum in R&D investment by universities in life and physical sciences fields, and considerable growth in life sciences job openings
–	Venture capital funding, development and other foundational metrics are still lagging

11. Pittsburgh

+	Considerable amount of momentum in core talent growth in a region home to many impressive universities
–	Lacks large talent pool, lab infrastructure and venture capital funding of start-ups

12. Minneapolis–St.Paul

+	Strong growth in core biotech talent in a highly educated market
–	Very little venture capital flowing in; not a great deal of life sciences companies have a location in the region

13. Houston

+	Strong growth numbers in talent, as well as an impressive base of research institutions and medical centers
–	Limited venture capital interest in private industry and a small amount of lab inventory

14. Chicago

+	Talent growth impressive for a market of its size
–	Low levels of venture capital flow and lab inventory in what is today a small life sciences market

15. Denver-Boulder

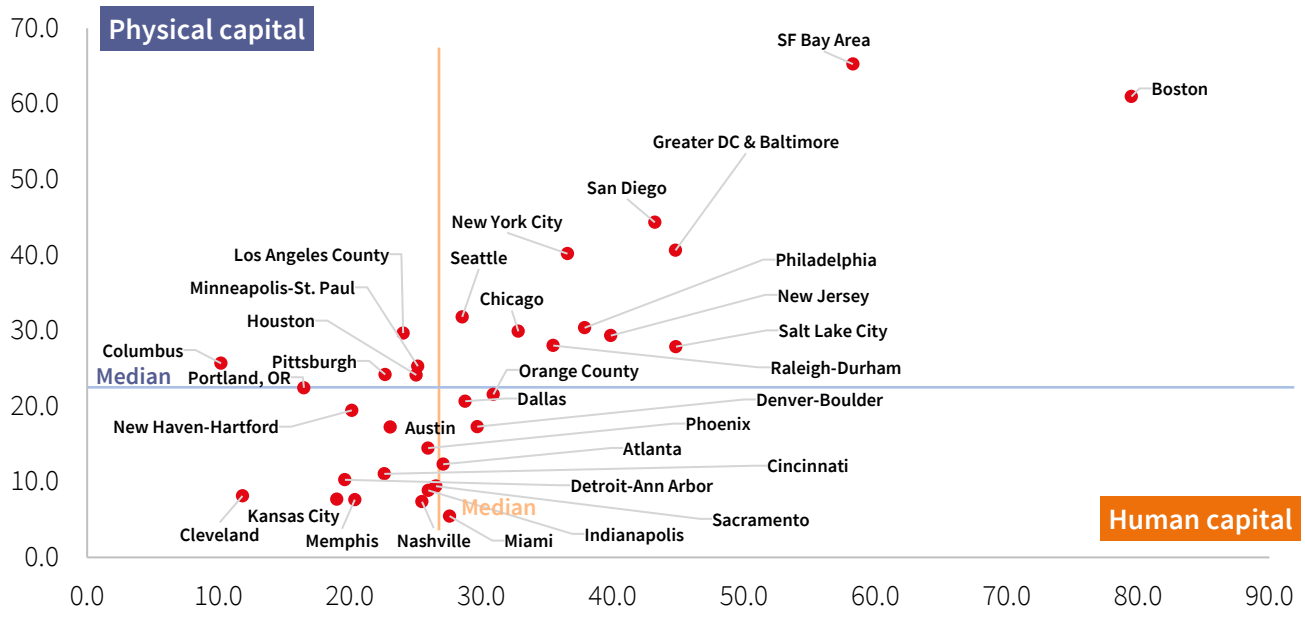
+	Strong momentum in core biotech talent and company formation in the past few years
–	Lacking in new lab development and venture capital interest

Another view for 2022...

New life sciences Cluster Composition Matrix

Every market is in a different place on their journey, so this year we offer a second view on how to compare markets. Top 10 lists can appear one-dimensional and diminish the nuance of what drives a cluster or where it stands relative to like-kind markets.

Our Life Sciences Market Composition Index is built from the same dataset as our ranking model and offers a view of where human capital and physical capital in each market stack up against the rest. This view can offer directional guidance for markets in terms of where to focus investment or where they lead above the others.



Our house view can be customized

- Talent, funding and commercial restate infrastructure are quantifiable market indicators, but our view on what defines opportunity is not meant to be one-size-fits-all but rather one-size-fits-most.
- Early-stage start-ups may value different qualities than established industry giants, resulting in different priorities when assessing new markets.
- Similarly, different investors likely have different strategies when building a portfolio, where some may prioritize university-anchored locations of a certain size while others are looking to penetrate the top markets to build scale.
- And local and state governments looking to develop or scale innovation communities, whether in partnership with universities or other local institutions, may place higher importance on metrics that illuminate where investment should focus to achieve these goals.

These groups have similar goals, but priorities differ. Strategies to achieve these goals may differ. This analysis is our house view but can be customized to highlight opportunities based on these different needs.

4. Outlook

What does this all mean?

The life sciences industry was catapulted into the public's consciousness amid COVID-19, and with it came an overheated sector with sky-high valuations, plentiful capital and new entrants into the development and investor spaces. 2022 has felt like a splash of cold water, reining in the excesses of 2021 and bringing the sector back down to earth and back in line with its pre-2021 long-run track.

Amid the uncertainty, this report is meant to spotlight the key ingredients that make a successful life sciences cluster ripe for growth. While the composition may vary, some mix of high-end scientific talent, innovative research institutions, funding sources and physical infrastructure is needed for a node to flourish.

Today, and as has been the case for decades, Boston and San Francisco stand head and shoulders above all other markets. San Diego is very much in a tier of its own between the twin behemoths and the rest of the markets. The best of the rest are Greater DC, Philadelphia, Raleigh-Durham, New Jersey, Seattle and New York City. In our Life Sciences Cluster Composition Matrix, all the above markets were above average in terms of both human capital and physical capital, which is a simplified model capturing the essence of what makes a life sciences market successful.

While those top markets garner the lion's share of leasing, funding and real estate investment, they do not have a monopoly over it. To varying degrees, most markets have ways in which they stand out and clear reasons why they do not match up with the top markets. Markets like Orange County, Denver-Boulder and Dallas have the talent and ideas but lag in physical infrastructure and funding to support their nascent sectors, indicating markets ripe for growth if given thoughtful development. Large markets like Los Angeles County and New York City today far exceed the funding and infrastructure given their level of talent concentrations and innovation, per our model.

Shifting our gaze to the immediate future, the sector is likely to experience the dynamic that has played out this year thus far into the new year. We expect large biopharmas to play an outsized role in the funding and acquisitions space, as they sit atop a mountain of cash that will need to be deployed. Further belt-tightening is expected into 2023. The biotech indexes may have hit a low point in early summer and a long, slow recovery in valuations may already be under way.

Research

Amber Schiada,
Americas Head of
Work Dynamics and
Industry Research

Mark Bruso
Senior Manager,
Boston Research

Maddie Holmes
Senior Analyst,
Industry Research

Business

Travis McCready
Head of Life Sciences,
Americas Markets

Roger Humphrey
President,
Life Sciences Work Dynamics

About JLL Life Sciences

JLL's vision is to reimagine the world of real estate, creating, finding, locating and operating safe and amazing spaces. JLL's Life Sciences team of 3,000+ experienced professionals are a safe pair of hands to help biotechnology, pharmaceutical, medical devices organizations, investors and developers achieve their ambitions. JLL brings deep understanding of location analytics, project management, research advisory, financial incentives, transaction management, capital markets, real estate strategy and technology, facilities management, regulatory compliance and quality, and more. Our solutions help fuel innovation, enhance efficiency, improve financial performance and attract and retain top talent. Our team is trained and certified to operate within office and critical, regulated environments of lab and manufacturing space. To learn more, visit us.jll.com/lifesciences.

About JLL Research

JLL's research team delivers intelligence, analysis and insight through market-leading reports and services that illuminate today's commercial real estate dynamics and identify tomorrow's challenges and opportunities. Our more than 400 global research professionals track and analyze economic and property trends and forecast future conditions in over 60 countries, producing unrivalled local and global perspectives. Our research and expertise, fueled by real-time information and innovative thinking around the world, creates a competitive advantage for our clients and drives successful strategies and optimal real estate decisions.